



TENNESSEE DEPARTMENT OF

EDUCATION
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Maintenance and Light Repair III (MLR III)

Primary Career Cluster:	Transportation, Distribution, & Logistics
Consultant:	Rachel Allen, (615) 532-2835, Rachel.Allen@tn.gov
Course Code(s):	5881
Prerequisite(s):	<i>Maintenance and Light Repair II</i> (5880)
Credit:	2
Grade Level:	11
Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation, Distribution, and Logistics courses.
Programs of Study and Sequence:	This is the third course in the <i>Automotive Maintenance and Light Repair</i> program of study.
Aligned Student Organization(s):	Skills USA: http://www.tnskillsusa.com Brandon Hudson, (615) 532-2804, Brandon.Hudson@tn.gov
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit http://tn.gov/education/cte/work_based_learning.shtml .
Available Student Industry Certifications:	ASE Student Certification can be obtained any time during <i>MLR III</i> or <i>MLR IV</i> courses. There are no work experience requirements to sit for the exam. Additionally, students completing the <i>MLR</i> program of study through a NATEF certified program may receive work experience to count toward the requirements for ASE Auto Maintenance and Light Repair Certification (G1).
Dual Credit or Dual Enrollment Opportunities:	Dual enrollment opportunities currently exist with specific Tennessee Colleges of Applied Technology. Reach out to local postsecondary institutions to identify current opportunities or establish new articulation agreements where needed.
Teacher Endorsement(s):	506, 508, 770
Required Teacher Certifications/Training:	ASE A-4, ASE A-5, ASE A-6, ASE A-8 Industry Certification 2016-17
Teacher Resources:	http://www.tn.gov/education/cte/doc/TransportationResourceList.pdf

Course Description

The *Maintenance and Light Repair III (MLR III)* course prepares students for entry into *Maintenance and Light Repair IV*. Students study and service suspension and steering systems and brake systems. Upon completing all of the Maintenance and Light Repair courses, students may enter automotive service industry as an ASE Certified MLR Technician.

Hours earned in the *Maintenance and Light Repair* courses may be used toward meeting National Automotive Technicians Education Foundation (NATEF) standards and Tennessee Department of Education standards. NATEF requires that 95% of the P-1 tasks, 80% of the P-2 tasks, and 50% of the P-3 tasks will be accomplished. These tasks are notated in these standards.

Program of Study Application

MLR III is the third course in the *Automotive Maintenance and Light Repair* program of study and covers important skills and knowledge on becoming a professional service technician. For more information on the benefits and requirements of implementing these programs in full, please see the program of study description documents found on the Transportation, Distribution, and Logistics website at <http://www.tn.gov/education/cte/TransportationDistributionLogistics.shtml>.

Course Standards

Standard 1.0

Students will perform safety examinations and maintain safety records.

Learning Expectations and Performance Indicators:

- 1.1 Use and inspect personal protective equipment. Demonstrate appropriate related safety procedures.
- 1.2 Inspect, maintain, and employ safe operating procedures with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment.
- 1.3 Demonstrate continuous awareness of potential hazards to self and others and respond appropriately.
- 1.4 Assume responsibilities under HazCom (Hazard Communication) regulations.
- 1.5 Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies to protect coworkers and bystanders from hazards; reporting of accidents and observed hazards; and regarding emergency response procedures.
- 1.6 Pass with 100% accuracy a written examination relating to safety issues relating specifically to Maintenance and Light Repair.
- 1.7 Pass with 100% accuracy a performance examination relating to safety issues relating specifically to Maintenance and Light Repair.
- 1.8 Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

Standard 2.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

Learning Expectations and Performance Indicators:

- 2.1 Cultivate positive leadership skills. Take part in opportunities to practice and demonstrate personal leadership skills. For example, taking advantage of opportunities provided by a career and technical student organization (CTSO), such as SkillsUSA.
- 2.2 Assess situations, apply problem-solving techniques and decision-making skills within the school, community, and workplace.
- 2.3 Participate as a team member in a learning environment.
- 2.4 Respect the opinions, customs, and individual differences of others.
- 2.5 Build personal career development by identifying career interests, strengths, and opportunities.

Standard 3.0

Students will inspect, service, and repair suspension and steering systems.

Learning Expectations and Performance Indicators:

- 3.1 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. (P-1)
- 3.2 Disable and enable supplemental restraint system (SRS). (P-1)
- 3.3 Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellow boots. (P-1)
- 3.4 Determine proper power steering fluid type; inspect fluid level and condition. (P-1)
- 3.5 Flush, fill, and bleed power steering system. (P-2)
- 3.6 Inspect for power steering fluid leakage; determine necessary action. (P-1)
- 3.7 Remove, inspect, replace, and adjust power steering pump drive belt. (P-1)
- 3.8 Inspect and replace power steering hoses and fittings. (P-2)
- 3.9 Replace power steering pump filter(s). (P-2)
- 3.10 Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. (P-1)
- 3.11 Inspect tie rod ends (sockets), tie rod sleeves, and clamps. (P-1)
- 3.12 Inspect upper and lower control arms, bushings, and shafts. (P-1)
- 3.13 Inspect and replace rebound and jounce bumpers. (P-1)
- 3.14 Inspect track bar, strut rods/radius arms, and related mounts and bushings. (P-1)
- 3.15 Inspect upper and lower ball joints (with or without wear indicators). (P-1)
- 3.16 Inspect suspension system coil springs and spring insulators (silencers). (P-1)
- 3.17 Inspect suspension system torsion bars and mounts. (P-1)
- 3.18 Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links. (P-1)
- 3.19 Inspect strut cartridge or assembly. (P-1)
- 3.20 Inspect front strut bearing and mount. (P-1)
- 3.21 Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. (P-1)
- 3.22 Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. (P-1)
- 3.23 Inspect, remove, and replace shock absorbers; inspect mounts and bushings. (P-1)
- 3.24 Inspect electric power-assisted steering. (P-3)
- 3.25 Identify hybrid vehicle power steering system electrical circuits and safety precautions. (P-2)
- 3.26 Describe the function of the power steering pressure switch. (P-3)
- 3.27 Perform pre-alignment inspection and measure vehicle ride height; determine necessary action. (P-1)

Standard 4.0

Students will inspect, service, and repair vehicle brake systems.

Learning Expectations and Performance Indicators:

- 4.1 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. (P-1)
- 4.2 Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). (P-1)
- 4.3 Measure brake pedal height, travel, and free play (as applicable); determine necessary action. (P-1)
- 4.4 Check master cylinder for external leaks and proper operation. (P-1)
- 4.5 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action. (P-1)
- 4.6 Select, handle, store, and fill brake fluids to proper level. (P-1)
- 4.7 Identify components of brake warning light system. (P-3)
- 4.8 Bleed and/or flush brake system. (P-1)
- 4.9 Test brake fluid for contamination. (P-1)
- 4.10 Remove, clean, inspect, and measure brake drum diameter; determine necessary action. (P-1)
- 4.11 Refinish brake drum and measure final drum diameter; compare with specifications. (P-1)
- 4.12 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. (P-1)
- 4.13 Inspect wheel cylinders for leaks and proper operation; remove and replace as need (P-2)
- 4.14 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. (P-2)
- 4.15 Install wheel and torque lug nuts. (P-1)
- 4.16 Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. (P-1)
- 4.17 Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. (P-1)
- 4.18 Remove, inspect, and replace pads and retaining hardware; determine necessary action. (P-1)
- 4.19 Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks. (P-1)
- 4.20 Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. (P-1)
- 4.21 Remove and reinstall rotor. (P-1)
- 4.22 Refinish rotor on vehicle; measure final rotor thickness and compare with specification (P-1)
- 4.23 Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. (P-1)
- 4.24 Retract and re-adjust caliper piston on an integral parking brake system. (P-3)
- 4.25 Check brake pad wear indicator; determine necessary action. (P-2)
- 4.26 Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. (P-1)

Standard 5.0

Students will inspect, service, and repair related vehicle brake systems.

Learning Expectations and Performance Indicators:

- 5.1 Check brake pedal travel with, and without, engine running to verify proper power boost operation. (P-2)
- 5.2 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. (P-1)
- 5.3 Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. (P-1)
- 5.4 Check parking brake cables and components for wear, binding, and corrosion; clean lubricate, adjust or replace as needed. (P-2)
- 5.5 Check parking brake operation and parking brake indicator light system operation; determine necessary action. (P-1)
- 5.6 Check operation of brake stop light system. (P-1)
- 5.7 Replace wheel bearing and race. (P-2)
- 5.8 Identify traction control/vehicle stability control system components. (P-3)
- 5.9 Describe the operation of a regenerative braking system. (P-3)

Teacher Resources

The following resources are available to assist teachers of this course.

- *Development Guidance: Classroom Activities*, Center on Education and Work, Madison, Wisconsin
- *A0 Fundamentals of Transportation Service Technology Course*, AYES Curriculum: A Tenth Grade Course, AYES Corporation, www.ayes.org
- *Introduction to Transportation Service Technology*, Service Series, Curriculum and Instructional Material Center (CIMC), Oklahoma Department of Vocational and Technical Education
- *Module 1 Introduction to Transportation Technology*, Instructional Materials Laboratory (IML), University of Missouri
- *Today's Technician Basic Transportation Service & Systems*, Webster & Owens, Delmar/ITP
- 2008 Automobile Task List, National Automotive Technicians Education Foundation (NATEF), www.natef.org
- General Motors Diagnostic Plan
- Ford Motor Company Diagnostic Plan
- Harley Davidson Institute